LISTING OF CLAIMS

This listing of the claims will replace all prior versions and listing of claims in the application.

1. (Original) A method for producing a solid material containing a dispersion of nanoparticles, the method comprising the steps of:

adding nanoparticles and a molten material to a container to form a pool within the container and rotating the container to create a convection vortex in the pool, the convection vortex causing the nanoparticles to be incorporated into the molten material so as to yield a molten composite material, the convection vortex further causing the molten composite material to be ejected from the container; and then

cooling the molten composite material to form a solid composite body comprising the nanoparticles uniformly dispersed in a matrix phase.

2. (Original) The method according to claim 1, wherein the nanoparticles are non-reactive with the molten material and the matrix phase of the solid composite body so that the nanoparticles do not undergo any substantial change in quantity, chemistry or size during the adding and cooling steps.

3. (Original) The method according to claim 1, wherein the nanoparticles are formed of at least one material selected from the group consisting of oxides, carbides, nitrides, oxycarbides, oxynitrides, carbonitrides, borides, phosphides, intermetallics, and complex combinations thereof.

4. (Original) The method according to claim 1, wherein the molten material comprises at least one material selected from the group consisting of aluminum, nickel, cobalt, iron, magnesium, titanium and copper.

5. (Original) The method according to claim 1, wherein the matrix phase of the solid composite body has predominantly nano-sized grains.

6. (Original) The method according to claim 1, wherein the molten composite material solidifies to form the solid composite body by contacting a mold after being ejected from the container.

7. (Original) The method according to claim 6, wherein the solid composite body has a graded dispersoid volume fraction and spacing.

8. (Original) The method according to claim 6, wherein the solid composite body is in the form of a near-net-shape body, preform or mill product.

9. (Original) The method according to claim 8, further comprising an additional step to physically alter the solid composite body so as to produce a component therefrom.

10. (Original) The method according to claim 9, further comprising the step of installing the component in a gas turbine engine.

11. (Withdrawn) The component produced by the method of claim 9.

12. (Original) The method according to claim 1, wherein the molten composite material solidifies in-flight after being ejected from the container.

13. (Original) The method according to claim 12, wherein the solid composite body is in the form of a powder particle, flake, wire or ribbon.

14. (Original) The method according to claim 13, further comprising the step of physically consolidating the solid composite body with a plurality of solid composite bodies produced by the method of claim 13 to form a component therefrom.

15. (Original) The method according to claim 14, further comprising the step of installing the component in a gas turbine engine.

16. (Withdrawn) The component produced by the method of claim 14.

17. (Original) The method according to claim 1, further comprising the step of pressurizing the container to regulate the rate at which the molten composite material is ejected from the container.

18. (Original) The method according to claim 17, wherein the pressure within the container is substantially constant during the ejecting step.

19. (Original) The method according to claim 17, wherein the pressure within the container is increased and decreased during the ejecting step so that the molten composite material is intermittently ejected from the container and solidifies in-flight so that the solid composite body is in the form of a powder particle, flake, wire or ribbon.

20. (Original) The method according to claim 17, wherein the pressure within the container is increased and decreased during the ejecting step so that the molten composite material is selectively ejected from the container onto a mold where the molten composite material solidifies to form the solid composite body.

21. (Original) A method for producing a solid material containing a dispersion of nanoparticles, the method comprising the steps of:

adding nanoparticles and a molten material to a container to form a pool within the container and rotating the container about a vertical axis thereof to create a convection vortex in the pool, the convection vortex causing the nanoparticles to be incorporated into the molten material so as to yield a molten composite material, the convection vortex further causing the molten composite material to be ejected from the container; and then

depositing the ejected molten composite material on a mold where the ejected molten composite material solidifies to form a solid composite body comprising the nanoparticles substantially uniformly dispersed in a matrix phase;

wherein the nanoparticles are non-reactive with the molten material and the matrix phase of the solid composite body so that the nanoparticles do not undergo any substantial change in quantity, chemistry or size during the adding and depositing steps.

22. (Original) The method according to claim 21, wherein the nanoparticles are formed of at least one material selected from the group consisting of oxides, carbides, nitrides, oxycarbides, oxynitrides, carbonitrides, borides, phosphides, intermetallics, and complex combinations thereof.

23. (Original) The method according to claim 21, wherein the molten material comprises at least one material selected from the group consisting of aluminum, nickel, cobalt, iron, magnesium, titanium and copper.

24. (Original) The method according to claim 21, wherein the matrix phase of the solid composite body has predominantly nano-sized grains.

25. (Original) The method according to claim 21, wherein the nanoparticles are added to the pool of the molten material at a variable rate so that the solid composite body has a graded dispersoid volume fraction and spacing in a direction thereof.

26. (Original) The method according to claim 21, wherein the solid composite body is in the form of a near-net-shape body, preform or mill product.

27. (Original) The method according to claim 21, further comprising an additional step to physically alter the solid composite body so as to produce a component therefrom.

28. (Original) The method according to claim 27, further comprising the step of installing the component in a gas turbine engine.

29. (Withdrawn) The component produced by the method of claim 27.

30. (Original) The method according to claim 21, further comprising the step of pressurizing the container to regulate the rate at which the molten composite material is ejected from the container, the pressure within the container being increased and decreased so that the molten composite material is selectively ejected from the container onto the mold.

31. (Original) A method for producing a solid material containing a dispersion of nanoparticles, the method comprising the steps of:

adding nanoparticles and a molten material to a container to form a pool within the container and rotating the container about a vertical axis thereof to create a convection vortex in the pool, the convection vortex causing the nanoparticles to be incorporated into the molten material so as to yield a molten composite material, the convection vortex further causing the molten composite material to be ejected from the container; and then

solidifying the molten composite material in-flight from the container to form a plurality of solid composite bodies, each solid composite body comprising the nanoparticles uniformly dispersed in a matrix phase;

wherein the nanoparticles are non-reactive with the molten material and the matrix phase of the solid composite bodies so that the nanoparticles do not undergo any substantial change in quantity, chemistry or size during the adding and solidifying steps.

32. (Original) The method according to claim 31, wherein the nanoparticles are formed of at least one material selected from the group consisting of oxides, carbides, nitrides, oxycarbides, oxynitrides, carbonitrides, borides, phosphides, intermetallics, and complex combinations thereof.

33. (Original) The method according to claim 31, wherein the molten material comprises at least one material selected from the group consisting of aluminum, nickel, cobalt, iron, magnesium, titanium and copper.

34. (Original) The method according to claim 31, wherein the matrix phase of the solid composite bodies has predominantly nano-sized grains.

35. (Original) The method according to claim 31, wherein the solid composite bodies are in the form of powder particles, flakes, wires or ribbons.

36. (Original) The method according to claim 31, further comprising the step of physically consolidating the solid composite bodies to form a component therefrom.

37. (Original) The method according to claim 36, further comprising the step of installing the component in a gas turbine engine.

38. (Withdrawn) The component produced by the method of claim 36.

39. (Original) The method according to claim 31, further comprising the step of pressurizing the container to regulate the rate at which the molten composite material is ejected from the container.

40. (Original) The method according to claim 39, wherein the pressure within the container is increased and decreased so that the molten composite material is intermittently ejected from the container.